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NEW CLAIMS

88. (NEW) A method for operating a pressure filter apparatus for separating a quantity of slurry (124) into slurry solids and slurry liquid to form a substantially dry slurry_solids filter cake said apparatus comprising:

at least one pressure sealable filtration chamber (120) consisting of continuously mating surfaces of relatively moveable upper and lower plates, means for opening and closing said filtration chamber by relatively moving said upper and lower plates,

a filter medium, said medium being disposed between said continuous mating surfaces of said upper and lower plates

means for moving said filter medium through said filtration chamber when said filtration chamber is open,

a source of slurry (124) coupled with said at least one filtration chamber,

at least one source of pressurizable fluid (126,128,130,132) coupled with said at least one filtration chamber,

separate valving means (A,B,D,E,F) for controlling entry of said slurry and said fluid into said at least one filtration chamber,

means for controlling said separate valving means (80) to uniformly distribute said slurry into said filtration chamber and for introducing said fluid into said filtration chamber when said filtration chamber is closed for separating slurry liquid from said slurry to form said slurry solids cake.

and means for moving said filter medium through said filtration chamber when said filtration

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the door is open for discharging said slurry solids cake (104) from said apparatus, the improvement characterized by the method steps of:

a) closing said upper and lower plates to establish said filtration chamber with said filter medium between said continuously mating surfaces

b) uniformly distributing said quantity of slurry (124,B,108) in said at least one filtration chamber (120);

c) introducing a hot gas fluid (126,A,108) into said filtration chamber to displace slurry liquids from said slurry and to form said substantially dry filter cake on said filter medium,

d) opening said filtration chamber by relatively moving said upper and lower plates,

e) then moving said filter medium through said open chamber, and

f) discharging (104) said dry filter cake from said filtration chamber on said filter medium.

39. (NEW) A method according to claim 38, wherein after uniformly distributing said quantity of slurry in said at least one sealable filtration chamber, said sealable filtration chamber comprising relatively movable upper and lower plates forming said sealable filtration chamber when closed with mating surfaces and movably enclosing a filter medium between said mating surfaces onto which said slurry is distributed, said chamber being pressurizable while said sealable filtration chamber is closed, the method includes the step of

forcing a first portion of said slurry liquid from said distributed slurry in said at least one sealable filtration chamber with a first quantity of fluid (D,E,F,108) to initiate formation of a filter cake of slurry solids within said chamber on said filter medium, and

while said sealable filtration chamber is closed said hot gas fluid (A,108) is passed through said initially formed filter cake to displace a further portion of said slurry liquid from said filter

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cake and to form said substantially dry filter cake.

40. (NEW) The method of claim 39 wherein said hot gas fluid is steam.

41. (NEW) The method of claim 40 wherein said steam is dry steam.

42. (NEW) The method of claim 39 wherein said hot gas is hot air, hot inert gas or steam, or combinations thereof.

43. (NEW) The method of claim 39 wherein said hot gas fluid is hot gas or hot air, hot inert gas or steam, or combinations thereof, and is passed through said initially formed filter cake in a sequence of individual selection of hot air, hot inert gas or steam, or combinations thereof, in an order determined by an initial analysis of the slurry to be separated into slurry solids and slurry liquid.

44. (NEW) The method of claim 39 wherein said slurry is initially pre-treated with heat from hot air, hot inert gas or steam, or combinations thereof, while being uniformly distributed in said filtration chamber.

45. (NEW) The method of claim 39 wherein introducing said first portion of fluid includes using hot wash fluid.

46. (NEW) The method of claim 39 wherein said filtration chamber is preheated prior to having said slurry uniformly distributed therein.

47. (NEW) The method of claim 46 wherein said filter chamber is pressurized with hot gas, hot inert gas, steam, or combinations thereof, prior to having said slurry uniformly distributed therein.

48. (NEW) The method of claim 43 wherein said sequence of passing hot air, hot inert gas or steam, or combinations thereof, through said filter cake is a repeated sequence of selected hot air,

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hot gas or steam, or combinations thereof.

49. (NEW) The method of claim 38 with the additional step of passing air or gas through said cake after said hot gas to cool said cake prior to discharging said dry filter cake from said filtration chamber.

50. (NEW) The method of claim 38 wherein said slurry fluid displaced from said filtration chamber is recirculated into contact with said slurry or hot gas to transfer heat from said slurry fluid to preheat said slurry or hot gas.

51. (NEW) The method of claim 38 wherein said hot gas fluid is hot air, hot gas or steam at elevated temperature and pressure within said filtration chamber and when exiting from said chamber.

52. (NEW) The method of claim 51 wherein said hot gas fluid is at a temperature of about 80 °C to about 230 °C.

53. (NEW) The method of claim 51 wherein said hot gas fluid is at a pressure about -55.16kPA (-8.0psi) to about 2,757.92kPA (400psi).

54. (NEW) The method of claim 38 wherein said hot gas fluid is selected by analysis of said slurry to be separated so as to prevent unwanted structural changes in said slurry solids in said filter cake formed in said filtration chamber.

55. (NEW) The method of claim 38 wherein means are provided in or associated with said filtration chamber for sensing conditions of temperature, pressure and filter cake formed condition, or combinations thereof, for controlling the distribution of said slurry in said filtration chamber and for controlling the introduction of said hot gas fluid to said filtration chamber.

56. (NEW) The method of claim 55 including controlling said distribution of slurry into said

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filtration chamber and said passing of said hot gas fluid in accord with said sensed conditions within said filtration chamber

57 (NEW) The method of claim 38 including the step of sealing said filtration chamber prior to distribution of said slurry, and then elevating the pressure in said sealed filtration chamber to a predetermined pressure.

58. (NEW) The method of claim 38 wherein said at least one filtration chamber has a plurality of input ports and exit ports for selectively entering said slurry or said hot gas fluid into said filtration chamber and for exiting liquids and hot gas fluid from said filtration chamber.

59. (NEW) A pressure filter apparatus for separating a slurry (124) into slurry liquid and slurry solids and for forming a substantially dry slurry solids cake on a filter medium from said slurry characterized by;

at least one pressure sealable filtration chamber (120) consisting of continuous mating surfaces of upper and lower plates, means for opening and closing said filtration chamber by relatively moving said upper and lower plates,

a filter medium, said medium being disposed between said continuous mating surfaces of said upper and lower plates,

means for moving said filter medium through said filtration chamber when said filtration chamber is open,

a source of slurry (124) coupled with said at least one filtration chamber,

at least one source of pressurizeable fluid (126,128,130,132) coupled with said at least one filtration chamber,

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separate valving means (A,B,D,E,F) for controlling entry of said slurry and said fluid into said at least one filtration chamber,

means for controlling said separate valving means (80) to uniformly distribute said slurry into said filtration chamber and for introducing said fluid into said filtration chamber for separating slurry liquid from said slurry to form said slurry solids cake on said filter medium,

and means for controlling movement of said filter medium through said filtration chamber when said filtration chamber is open for discharging said slurry solids cake (104) from said apparatus.

60. (NEW) The apparatus of claim 59 wherein said at least one source of fluid coupled to said at least one filtration chamber includes a source of hot gas.

61. (NEW) The apparatus of claim 60 wherein said source of hot gas (126) includes hot air, hot inert gas, or steam, or combinations thereof.

62. (NEW) The apparatus of claim 60 including a steam source (809) that produces steam at elevated pressure and temperature.

63. (NEW) The apparatus of claim 59 wherein said means for controlling said valving means is a programmable controller (80) that can be programmed to pass said at least one source of fluid into said at least one filtration chamber in a desired sequence of any one or all of the following steps:

initiating the formation of a filter cake,

dewatering said cake,

washing said cake,

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changing the temperature of said cake, or

discharging said cake from said filter apparatus.

64. (NEW) The apparatus of claim 59 wherein said apparatus includes means for coupling said separated slurry liquids with at least one of said sources of slurry or said source of fluid to pretreat said sources prior to entry into said filter apparatus.

65. (NEW) The apparatus of claim 63 wherein said programmable controller (80) is programmed to apply hot air, hot inert gas or steam, or combinations thereof, in preprogrammed sequences to produce said substantially dry cake.

66. (NEW) The apparatus of claim 59 having a source of compressed air (130, 132), a source of inert gas (130, 132), and a steam source (126) being connected to said apparatus and said source of fluid being coupled with said source of compressed air, source of inert gas and steam source to coordinate pressure, temperature and conditions within said at least one filtration chamber (120) with conditions in said source of compressed air, source of inert gas and steam source.

67. (NEW) The apparatus of claim 59 including means for supplying wash fluids (128) to said at least one filtration chamber for treating said substantially dry filter cake.

68. (NEW) The apparatus of claim 59 including a filter medium (104) disposed within said at least one filtration chamber (120) for supporting said substantially dry filter cake,

means for transporting (115, 117) said filter medium through said filtration chamber,

and means for cleaning (400, 402) said filter medium.

69. (NEW) The apparatus of claim 68 wherein said cleaning means is a driven brush (300) mechanism (402) that contacts said filter medium.

70. (NEW) The apparatus of claim 68 wherein said cleaning means includes a source of fluid

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(854) for cleaning and treating said filter medium.

71. (NEW) The apparatus of claim 59 including vibrator means (200) connected to said at least one filter chamber for vibrating said chamber during said discharge of said dry cake from said apparatus.

72. (NEW) The apparatus of claim 59 wherein said apparatus includes:

a plurality of filtration chambers in operating cooperation,

said source of slurry coupled to each of said plurality of filtration chambers,

said source of fluid coupled to each of said filtration chambers,

said separate valving means includes valving means associated with each of said filtration chambers, and

said means for moving said filter medium for discharging said dry cake from said filtration chamber is coupled to each of said filtration chambers.

73. (NEW) A pressure filter apparatus according to claim 59 wherein said at least one filtration chamber is a dual sided filtration chamber including filter media on both sides of said chamber,

said slurry input means is connected to said chamber between said filter media,

said at least one source of fluid is coupled to said chamber between said filter media, said source including hot gas, inert gas and steam, or combinations thereof,

said apparatus includes a flexible diaphragm in cooperating engagement with said filter media,

and fluid means coupled to said flexible diaphragm for squeezing said diaphragm against said filter media for removing liquids from said slurry within said chamber and for forming said substantially dry filter cake.